

## 2D Mesh Files

Two-dimensional finite element meshes are stored in 2D mesh files. The types of elements supported in *GMS* and the numbering sequence for the elements are shown in Figure 13. The file format is shown in Figure 14 and a sample 2D mesh file is shown in Figure 15.

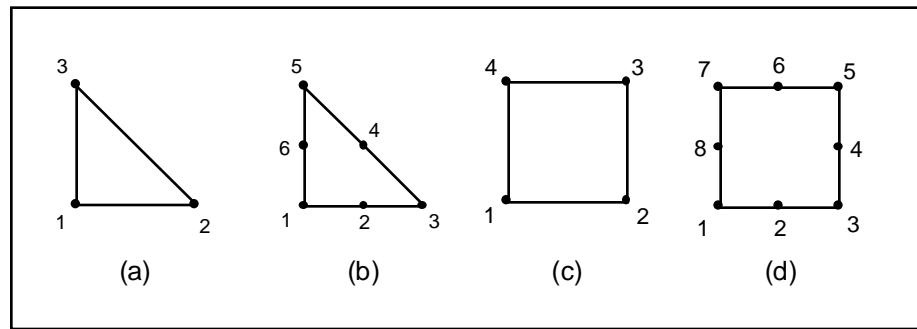


Figure 13 The Four Basic 2D Elements. (a) Linear Triangles (b) Quadratic Triangles (c) Linear Quadrilaterals (d) Quadratic Quadrilaterals.

```
MESH2D /* File type identifier */
E3T id n1 n2 n3 mat /* 3 node triangle */
E6T id n1 n2 n3 n4 n5 n6 mat /* 6 node triangle */
E4Q id n1 n2 n3 n4 mat /* 4 node quad */
E8Q id n1 n2 n3 n4 n5 n6 n7 n8 mat /* 8 node quad */
ND id x y z /* Nodal coordinates */
```

Figure 14 2D Mesh File Format.

```
MESH2D
E4Q    1      4      5      2      1      0
E4Q    2      5      6      3      2      0
E3T    3      7      5      4      0
E3T    4      7      8      5      0
E3T    5      8      6      5      0
E3T    6      8      9      6      0
ND    1 2.00000000e+001 1.00000000e+002 0.00000000e+000
ND    2 2.00000000e+001 9.00000000e+001 0.00000000e+000
ND    3 2.00000000e+001 8.00000000e+001 0.00000000e+000
ND    4 1.00000000e+001 1.00000000e+002 0.00000000e+000
ND    5 1.00000000e+001 9.00000000e+001 0.00000000e+000
ND    6 1.00000000e+001 8.00000000e+001 0.00000000e+000
ND    7 0.00000000e+000 1.00000000e+002 0.00000000e+000
ND    8 0.00000000e+000 9.00000000e+001 0.00000000e+000
ND    9 0.00000000e+000 8.00000000e+001 0.00000000e+000
```

Figure 15 Sample 2D Mesh File.

The card types used in the 2D mesh file are as follows:

Card Type	MESH2D
Description	File type identifier. Must be on first line of file. No fields.
Required	YES

<i>Card Type</i>	<b>E3T</b>		
<i>Description</i>	Defines a three node (linear) triangular element.		
<i>Required</i>	NO		
<i>Format</i>	E3T id n1 n2 n3 mat		
<i>Sample</i>	E3T 283 13 32 27 4		
<i>Field</i>	<i>Variable</i>	<i>Value</i>	<i>Description</i>
1	id	+	The id of the element.
2-4	n1-n3	+	The nodal indices of the element ordered counterclockwise.
5	mat	+	The material id for the element.

<i>Card Type</i>	<b>E6T</b>		
<i>Description</i>	Defines a six node (quadratic) triangular element.		
<i>Required</i>	NO		
<i>Format</i>	E6T id n1 n2 n3 n4 n5 n6 mat		
<i>Sample</i>	E6T 283 13 32 27 22 25 30 4		
<i>Field</i>	<i>Variable</i>	<i>Value</i>	<i>Description</i>
1	id	+	The id of the element.
2-7	n1-n6	+	The nodal indices of the element ordered counterclockwise starting at a corner node.
8	mat	+	The material id for the element.

<i>Card Type</i>	<b>E4Q</b>		
<i>Description</i>	Defines a four node (linear) quadrilateral element.		
<i>Required</i>	NO		
<i>Format</i>	E4Q id n1 n2 n3 n4 mat		
<i>Sample</i>	E4Q 283 13 32 27 30 4		
<i>Field</i>	<i>Variable</i>	<i>Value</i>	<i>Description</i>
1	id	+	The id of the element.
2-5	n1-n4	+	The nodal indices of the element ordered counterclockwise.
6	mat	+	The material id for the element.

<i>Card Type</i>	<b>E8Q</b>		
<i>Description</i>	Defines an eight node (quadratic) quadrilateral element.		
<i>Required</i>	NO		
<i>Format</i>	E8T id n1 n2 n3 n4 n5 n6 n7 n8 mat		
<i>Sample</i>	E8T 283 13 32 27 22 25 30 29 31 4		
<i>Field</i>	<i>Variable</i>	<i>Value</i>	<i>Description</i>
1	id	+	The id of the element.
2-9	n1-n8	+	The nodal indices of the element ordered counterclockwise starting at a corner node.
10	mat	+	The material id for the element.

<i>Card Type</i>	<b>ND</b>		
<i>Description</i>	Defines the coordinates of a node.		
<i>Required</i>	NO		
<i>Format</i>	ND id x y z		
<i>Sample</i>	ND 84 120.4 380.3 5632.0		
<i>Field</i>	<i>Variable</i>	<i>Value</i>	<i>Description</i>

---

1	id	+	The id of the node.
2-4	x , y , z	±	The nodal coordinates.